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Employer-Sponsored Training by Firm Size

Richard Chaykowski (Queen's University)
George Slotsve (Northern Illinois University)

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Abstract

Firm-level training activity is a major source of labour force skills formation in Canada and the United States and, therefore, important to productivity growth. The focus of this paper is the relationship between firm size and employer sponsored training. The main issues considered include are whether or not the types and overall level of training activity generated by employers is adequate, whether some firms under-invest in training, and whether there are labour market or other institutional factors present that impede employer-sponsored training activity.

The paper begins by considering firm size and labour productivity, and finds that both shifts in product demand and technological innovation are important factors that could affect training by firm size. As well, the level, amount, and type of employer sponsored training activity undertaken in smaller versus larger firms may be related to the different benefits and costs of such training across firms of different sizes. Another focus is the importance of internal-to-the-firm organizational structures for employer training and changes in organizations, the workforce, and employment for employer-sponsored training in smaller versus larger firms.

The paper develops further research areas, including sources of variation in the benefits and costs of training, the relationship between institutional arrangements and training outcomes, who receives training and who does not within firms of different sizes, barriers to training in small versus large firms, the nature of formal versus informal training in small versus large firms, and the impact of alternative policy regimes on training outcomes. The paper identifies the potential value of data sets such as the WES in furthering a more comprehensive research agenda on training and firm size, and considers the value of supplementing large-scale data sets with analyses based on industry or firm-level administrative or case studies in order to account for the affects of institutional factors on training outcomes.

Résumé

La formation en entreprise est une source majeure d'acquisition de compétences pour la main-d'oeuvre au Canada et aux États-Unis et, par conséquent, elle joue un rôle important dans la croissance de la productivité. Le présent document porte principalement sur le lien entre la taille de l'entreprise et la formation en entreprise. Les auteurs ont voulu savoir si le type et le niveau global de formation, offerte par les employeurs, sont adéquats, si certaines entreprises sous-investissent dans la formation et si certains facteurs d'ordre institutionnel ou liés au marché du travail font obstacle à la formation en entreprise.

Les auteurs ont commencé par étudier la taille des entreprises et la productivité de la main-d'oeuvre, et ils ont trouvé que l'évolution de la demande des produits et l'innovation

technologique constituent des facteurs importants qui pourraient influer sur la formation selon la taille de l'entreprise. De plus, le niveau, la quantité et le type de formation en entreprise offerte dans une petite ou une grande entreprise peuvent être liés aux avantages et aux coûts de la formation, qui varient selon la taille des entreprises. Les auteurs traitent aussi de l'importance des structures organisationnelles internes pour la formation en entreprise et des changements au sein de l'entreprise, de la main-d'oeuvre et de l'emploi pour la formation en entreprise dans une petite ou une grande entreprise.

Les auteurs ont aussi axé leurs recherches sur les points suivants : la cause de la variation des avantages et des coûts de la formation, le lien entre les dispositions institutionnelles et les résultats en matière de formation, les employés qui reçoivent de la formation et ceux qui n'en reçoivent pas, selon la taille de l'entreprise, les obstacles à la formation dans les petites et les grandes entreprises, la formation officielle par opposition à la formation non officielle dans les petites et les grandes entreprises et, enfin, l'incidence des politiques de l'entreprise sur les résultats en matière de formation. Ils parlent de la valeur potentielle des ensembles de données telles que l'Enquête sur le lieu de travail et les employés (ELTE) pour l'avancement d'un programme de recherche plus approfondie sur la formation et la taille des entreprises, et ils examinent l'utilité de compléter les ensembles de données à grande échelle par des analyses fondées sur des données ou des études de cas touchant certaines entreprises ou industries afin de tenir compte des conséquences de certains facteurs institutionnels sur les résultats en matière de formation.

> "In the spring of 2002, he [Larry Summers, President of Harvard] attended a discussion about globalization … [and] They were going in the direction that globalization pointed to the need for more education directed at multicultural understanding, … [and Larry Summers] said that … globalization meant global competition, and that it made the basic capacity to read and do arithmetic more important."[1]

1. Introduction to the Key Issues

Supporting productivity growth has become a primary objective of government economic policy. While there are a number of economic factors that determine productivity, achieving advanced levels of skills and education of a nation's labour force are widely viewed as a necessary condition for enhancing productivity and economic development.[2] Human capital formation, through education, training, and skills development, is recognized as a primary determinant of worker productivity and earnings as well as firm productivity – and, therefore, broader economic growth.[3]

At the macro- level, Courchene (2001) (for Canada) and Thurow (1999; 1992), and Reich (1992) (both for the United States), among others, have made this argument for *nations*. This argument hinges on the notion that traditional sources of comparative advantage, founded on such national characteristics as geographically concentrated and scarce natural resources, large capital pools, and technological advances whose diffusion can be limited, have all eroded under the forces of globalization. The globalization of product and capital markets, and the accelerated rate of development and diffusion of technological innovation, has rendered these traditional sources of economic advantage less potent. The argument, then, is that the quality of a nation's labour force becomes a major determinant of a nation's economic competitiveness.[4] This argument holds, with similar strength, to countries experiencing significantly increased regional economic integration.

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[1] Excerpt from: "Harvard Radical" by James Traub, *The New York Times Magazine*, August 24, 2003, p. 33.

[2] Examining the human capital dimensions of productivity growth Harris (2002, p. 17) finds that for the period 1988 to 1995, "labour quality increases in Canada accounted for 58 percent of the productivity residual." The corresponding figure for the United States was 61 percent.

[3] Generally, on training, skills and earnings see Becker (1975) and Mincer (1974). For empirical evidence see Barrett and O'Connell (2001), Black and Lynch (2002) and Lynch, (1992).

[4] Another way of stating this argument is in terms of a basic production function in which labour and capital are combined, using some technology, to produce output. Since the "quality" (i.e., technological level) of capital diffuses, and the "quantity" of capital is mobile, and the "quantity" of labour is reasonably readily adjusted, then it is the "quality" (i.e., skills and education) dimension of labour that represents the last source of competitive advantage.

This argument is especially relevant in a country such as Canada, which has historically relied upon resources and standardized production technologies as sources of comparative advantage. Canada is increasingly integrated with the United States in terms of product and capital markets, and in terms of the development and application of pure and applied technologies. While Canada's labour market operates separately, it is not unaffected by changes in the American or Mexican labour market and, increasingly, it experiences osmosis along a number of skill dimensions of the labour force.

The fundamental issue, then, is whether or not the level of education and training generated is, from a broader national competitiveness viewpoint, optimal. If it is not optimal (from an economic as opposed to a social viewpoint), this may be due to some market failure, the presence institutional constraints or rigidities in creating the desired level of training outputs, and so forth. We often observe in practice what appear to be imperfect markets – at the broader labour market level in terms of such outcomes as skill bottlenecks in the labour market; or among educational institutions that have not fully adapted their programs to address shortages in certain skill areas; and at the organizational and workplace levels, as firms attempt to meet their emerging skill requirements. In these cases, the larger issue is whether or not these outcomes represent substantive, long term market failures that suggest a role for government policy, or whether they represent outcomes that, in practice, are to be expected in a process of market adjustment toward a new equilibrium.[5]

Firm-level training activity is a major source of labour force skills formation in Canada and the United States. Employer-sponsored training activity occurs both outside the firm, as well as through formal and informal on-the-job training. For the firm, the decision to invest in worker training, and the amount of that investment, depends upon several general factors, including employers' training requirements, the expected return on training investments, the availability of investment capital, and whether or not government policies facilitate the training investment decision.[6] The main issues regarding firm-level training are whether or not the types and overall level of training activity generated by employers is adequate, whether some firms under-invest in training, and whether there are labour market or other institutional factors present that impede employer-sponsored training activity.

The main focus of this paper is the relationship between firm size and employer sponsored training. A number of research studies have considered the issue of differences in training incidence across firm sizes, and found that firm size matters. Our analysis

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[5] Putting aside, for the moment, important issues of social and political influences on national human capital formation, our premise is that primarily labour market forces determine the level and type of training and education outcomes. The operation of markets is conditioned by the myriad of institutional arrangements within which they are embedded – so, too, are education and training outcomes. In the case of training, the institutional arrangements include the broader education system, as well as workplace-level organizational arrangements for the delivery of training within firms.

[6] Not surprisingly, then, training activity has been an ongoing subject of considerable empirical research. Refer to early work by Tan et al. (1992), Brown (1990) and Simpson (1984).

emphasizes the importance of labour market factors in determining the level and type of employer-sponsored training. While our focus is the economic factors that determine training activity by firm size, we also call attention to the importance of institutional arrangements, particularly the effect of organizational (establishment) factors on training.[7]

The key policy issues include why differences in training occurs across firms of different sizes, whether the market generates sufficient training activity and intensity of training in smaller firms, and whether the training and education systems promote the optimal level of training in smaller firms. If the market is not generating the appropriate level of training, especially among smaller firms, then there may be a role for government to enhance training.[8]

The outline is the paper is as follows. In the next section we begin by considering firm size and labour productivity. We summarize the trends in firm size and labour productivity for Canada and the United States and discuss the implications of these trends for employer sponsored training. We consider the effect of changes in product demand, which could affect the quantity of labour demanded as well as the amount of employer-supported training, and technological innovation, which could be associated with changes in the extent and level of employer-sponsored training activity.

In the third section, we consider the sources of variation in the costs and benefits of training and the labour market factors that affect variation among small versus large firms. We consider issues related to turnover, technology and access to capital, and occupational and industrial mix. This is followed by a discussion of formal and informal training and how they may be affected by firm size. Here we focus on the role of formal and informal training in human capital formation, the incidence of formal versus informal training, and worker characteristics.

This is followed by a discussion, in the fourth section, of institutional considerations. Our main focus is on the importance of internal-to-the-firm organizational structures for employer training and how changes in organizations, the workforce, and employment have implications for employer-sponsored training in smaller versus larger firms. We also emphasize the importance of training related to "organizational technology" and introduce the relatively new concept of "organizational capital" which is partly defined in relation to the organizational technology.

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[7] Institutional considerations are important because they determine if and how training is provided inside the "black box" of firms, and take into account establishment factors that may affect the actual training decisions of employers and employees as well as the policies of employers themselves. See Frazis et al. (1998).

[8] The emphasis on small and medium sized firms also reflects the finding by the Picot and Dupuy (1996, p. 14) that "for both the entire Canadian commercial economy and the manufacturing sector, the growth rate of net [and gross] employment decreases monotonically as firm size increase."

In the fifth section we provide a concise review of the stylized findings from the main empirical studies of training activity in Canada and the United States, with a view to assessing the primary regularities regarding training activity and firm size. This review of results regarding training and firm size provides a context for the sixth section, which considers future areas for research related to employer-sponsored training, and section seven, which focuses on the characteristics of the main existing data bases and future data requirements to support a research agenda on employer sponsored training and firm size. The final section includes a discussion of some of the main issues raised by the review.

2. Trends in Firm Size and Labour Productivity

In economics the role of the firm is to hire inputs and organize production. However, how production is organized and inputs are hired differ by the size of the firm (Oi and Idson, 1999). There appears, in fact, to be a great deal of heterogeneity in size and organizational characteristics across firms – even within the same industry. In this section we first consider the trends in firm size and the unit of measurement. We then examine the factors that play a role in the determination of firm size. We are especially interested in the role of foreign competition and innovation in affecting relative factor prices, firm size, and productivity.

2.1 Trends in Firm Size and the Relevant Unit of Analysis

The standard text model of the firm (that is, single product firms, U-shaped average and marginal cost curves, and access to similar technology) predicts that, in a competitive industry, firms will be of similar size. However, data show that firm size varies both within and across industries.[9] For example, firms in the service sector tend to be smaller than firms in the manufacturing sector. In addition, as Table 1 illustrates, since the 1970s, the proportion of total employment has increased in small (defined as less than 100 employees) manufacturing plants by roughly 9 percentage points for Canada and 6 percentage points for the United States. In contrast, the share of total employment in large (defined as 500+ employees) plants decreased by approximately 9 percentage points in both Canada and the United States.[10] More recently, however, as Baldwin et al. (2002, p. 16) note, "both countries show … a discontinuation of [the] employment shift from large to small plants during the 1990s." As Table 1 shows, the share of total employment in small and large manufacturing plants in Canada have both declined somewhat since the early 1990s, whereas the share of total employment in medium (100-499 employees) sized plants has increased.

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[9] A number of theories have been proposed to account for the size distribution of firms in situations where the industry is competitive. Baumol et al. (2003, Chapter 3) note that there may exist differences in cost curves across firms; average cost curves may be flat-bottomed; and, many firms are multi-product firms. Differences in cost curves result in a situation where the minimum average cost (the same for all firms) corresponds to different output levels across firms. For example, relative input price variation can result in one firm using relatively more skilled labor and another using relatively more unskilled labor. In this case, they argue that the optimal output level (corresponding to the minimum average cost) will be lower at the firm using relatively more skilled labor. A consequence of a flat-bottomed average cost is that many output levels are compatible with the minimum of the average cost curve. Each output level corresponds to a different sized firm. Variation in firm size can also occur for multi-product firms because economies of scale and scope matter. Other theories have emphasized entrepreneurial ability and economies of scope (Lucas, 1977) and learning, selection and technological shocks (Jovanovic, 1982 and Pakes and Ericson, 1995).

[10] Small and medium manufacturing plants account for a larger share of total employment in Canada than in the United States. The United States, relative to Canada, has a higher share in larger plants. See Table 1.

A slightly different characterization of trends in the United States is provided by Baumol et al. (2003, p. 260-261), who conclude that, in the United States, large manufacturing firms shrank (downsized) while small manufacturing firms and firms outside of manufacturing "upsized" during the 1980s and 1990s. Baumol et al. (2003) and Baldwin et al. (2002) therefore appear to find a different trend in the size of small manufacturing firms for the United States. This difference can probably be explained by the use of different measures of the size distribution; Baumol et al. (2003) measure the size distribution of firms, whereas Baldwin et al. measure the size distribution of establishments (plants). This type of difference in trends raises an important question regarding the appropriate unit of analysis in considering issues related to firm size and training? We return to this point later in the context of our discussion of formal and informal training.

2.2 Factors Affecting Shifts in Firm Size

What appear to be the most important factors affecting the recent shifts in the size distribution of firms? Baumol et al. (2003) find support for two main factors in the United States.

In the short run the most important influence on firm size is product demand. As expected, when industry demand is weak firms reduce the number of employees; when industry demand is strong firms increase their labour force. All else being equal, we would expect shifts in demand to primarily affect the quantity of labour demanded at each skill level. This could have the effect of increasing the demand for already trained labour as well as the amount of employer-supported training as firms expand their work forces.

In the long run Baumol et al. (2003) find that technological innovations appear to have the greatest influence on firm size. The effect of technological innovation on firm size depends upon whether the innovations enhance economies of scale (leading to larger firms and establishments). It is also possible, however, for technological innovation to reduce firm size (through the substitution of capital or skilled labour for unskilled labour). In either event, we expect technological innovation to change both skill levels and mix within firms as their size changes, and that this will be associated with changes in the extent of employer-sponsored training activity.

Both changes in demand and technological innovation are likely to be important for Canada, even though Canada and the United States differ in their economic and social systems. In particular, foreign competition plays a greater role in Canada.[11] Competition ensures that firms are producing at the minimum of their average cost curve which, in turn, influences firm size. Foreign competition also influences relative input prices which, in turn, affect the capital-to-labour ratio of firms.[12] The influence on firm size depends

[11] Baldwin et al. (2002, p. 21) also note "a larger percentage of the Canadian manufacturing sector is foreign-controlled; there are higher levels of unionization in Canada, and Canadian markets are more concentrated than U.S. markets."
[12] Refer to Baumol et al. (2003) pages 87-89.

upon whether firms substitute either capital or skilled labour for unskilled labour; this in turn depends upon how the relative input prices change. The effect of foreign competition on firm decisions is therefore expected to be a more important factor in more competitive industries.

A measure of relative labour productivity (relative value-added per employee) by firm size is presented in Table 2 for Canada and the United States.[13] Since the 1970s, we observe a decline in labour productivity at small manufacturing plants in both countries. In medium sized plants, labour productivity has risen in Canada but has been stable in the United States. In marked contrast, among large manufacturing plants labour productivity has dramatically increased between the 1970s and the 1990s in both Canada and the United States. Baldwin et al. (2002, p. 19) conclude "the similarity in the structural change in the two countries means that it is unlikely that the causes of change can be found in country-specific circumstances… the causes of restructuring must be found elsewhere – either in changes in technology or in changes that have led to more outsourcing or disintermediation."

The upshot of the preceding discussion, from a Canadian perspective, is that there are important roles for the influence of foreign competition on relative input prices and for technological innovations in having an effect on firm size and labour productivity. Oi and Idson (1999) for the United States, and Baldwin and Sabourin (1995) for Canada, as examples, find that smaller firms are less likely to adopt new technologies. The considerations raise basic questions in three areas:

> 1st: Are technological innovations and changes in relative input prices leading to an increased demand for more highly skilled or trained workers?
>
> 2nd: Are small and medium sized firm not adopting new technology due to difficulties in providing appropriate training for their workforces? And if so, what are the difficulties faced by small and medium size firms?
>
> 3rd: Why has labour productivity declined at smaller firms? Is it due to a lack of training or are there it other factors at work (as well)?

To our knowledge, there has not been a study similar to that of Baldwin et al. (2002) that examines firm size and labour productivity trends in the non-manufacturing sector. This type of study would add considerably to out knowledge of developments in firm size throughout the economy. Are small firms in the Canadian non-manufacturing sector "upsizing" as in the United States? This is of particular importance in the context of the questions raised above: the answers may, in fact, be quite different for the manufacturing and the non-manufacturing sectors, respectively. Alternatively, we may find that the training requirements of smaller firms may differ between the manufacturing and the non-manufacturing sectors.

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[13] Baldwin et al. (2002) obtain similar results to those presented in Table 2 when they use relative shipments per employee as a measure of labour productivity.

3. The Costs and Benefits of Training, Formal and Informal Training, and Firm Size

Oi and Idson (1999) note that the amount of training -- both formal and informal -- provided to workers increases with firm size (and establishment size) and the difference in training investments between large and small firms also increases with skill level (p. 2205).[14] Given the ongoing changes in the size distribution of firms, we turn in this section to a consideration of economic aspects of the decision to invest in the human capital of the firm's workforce.

We begin by considering how small and medium enterprises (SME) and large firms may differ in the costs and benefits of training investments. Here we essentially ask what are the sources of variation in the costs and benefits of training. Second, we examine formal versus informal training. We explore what labour market factors may be associated with a firm's decision to invest in formal versus informal training in order to shed light on how that might be associated with firm size.

3.1 Sources of Variation in the Costs and Benefits of Training

Many factors that potentially affect the costs and benefits (productivity or profitability) of employer-sponsored training vary with firm size. Oi and Idson (1999) found that smaller firms are less likely to organize production around formal teams, substitute capital for labour, and adopt new technologies (also see Baldwin and Sabourin (1995) for Canada). A number of other factors are found to be correlated with firm size. For example, smaller firms pay workers a lower wage (see Morissette (1993) for Canada); have higher turnover rates (see Picot and Baldwin (1990) for Canada); have poorer access to credit or financial markets; are less likely to have an internal labour market; and, are more likely to file for bankruptcy. All of these factors affect the firms' decision to train workers.

(i) Turnover and Training

An established empirical regularity is that the probability of the worker-firm job match ending declines with tenure.[15] This is generally interpreted as reflecting the "quality" of the worker-firm match. One way of thinking about this is that the worker and firm are able to increase their knowledge of working conditions and productivity, respectively, as job tenure increases. This results in an increased confidence about the quality of the match.[16]

This idea of match quality is critical to building confidence between workers and firms that the match will last long enough to obtain a return from a training investment, specifically employer-sponsored training. Large firms are also more likely to have an internal labour market that provides workers with greater opportunity for promotion.

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[14] See Oi and Idson (1999) for a discussion of many of the labour market correlates of firm size that have been found in the literature.

Therefore, it is not surprising that employee quit rates are higher in smaller firms. This is also consistent with the finding that higher wages are correlated with firm size.

If smaller firms have higher turnover rates (lower levels of tenure), then smaller firms have a shorter time horizon over which the benefits of training accrue. Consequently, smaller firms are expected to provide less training than larger firms. Additionally, smaller firms will tend to invest in training where the productivity (profitability) benefits are realized more immediately.

(ii) Access to Capital and Training Delivery

One implication of smaller firms having poorer access to financial markets is that the cost of investment in training will be higher in smaller firms. As Bishop (1997) has argued, larger firms can take advantage of "economies of scale" in training. Consequently, larger firms have the ability to pool risks and thereby reduce their per employee training costs. The incidence of employer training has been found to rise with firm size (Betcherman et al. (1997), Baldwin and Johnson (1995), and Lynch and Black (1995)). Betcherman et al. (1997) also find that smaller firms are more likely to cite the cost of training as a barrier than are larger firms.

Small and large firms also appear to deliver training differently. Co-workers provide more training in larger firms. In smaller firms, managers and supervisors provide the training (Bishop, 1997). Consequently, the marginal cost of training is expected to be higher in smaller firms. Smaller firms are less likely to organize production around teams, have an internal labor market or follow different human resource management practices (see Oi and Idson (1999) and Bishop (1997)). Larger firms may be better at solving the assignment problem due, perhaps, to internal labor markets providing the firm with better information about worker productivity.

(iii) Skill/Occupational Mix, Industry and Training

Oi and Idson (1999) and Baldwin and Sabourin (1995) find that smaller firms are less likely to adopt new technologies. This is consistent with the findings of Oi and Idson (1999) that smaller firms tend to employ less skilled workers. Leckie et al. (2001) also find that the incidence of training is higher when worker skills are being upgraded. If "skill begets skill" – as argued by Mincer (1962) – and the returns to training are lower for less skilled workers then, all else equal, smaller firms would be expected to provide less training.

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[15] For a comprehensive review, see Farber (1999).

[16] That is, suppose that the probability that a given a worker-firm match survives for t periods is ?. Given that the match in fact survives to time t, then the probability that it survives to period 2t is some higher probability (? + ?) where ? depends upon degree to which the worker's and firm's uncertainty about the quality of the match has been reduced and to which they do not learn new negative information that induces them to cause a separation.

We also know that education and training are positively correlated. Workers with higher levels of education tend to have greater access to training and tend to train more.[17] In this regard, we would benefit from more information about the distribution of skill levels and types across firm sizes. We suspect that this distribution has shifted over time, in part because large firms now prefer to contract out many types of specialized or highly skilled functions, such as engineering and research and development services.[18]

Betcherman et al. (1997) and Lynch and Black (1995) find that the incidence of formal training is higher in the non-manufacturing sector. This finding highlights the need to better understand the nature of the differences between the manufacturing and non-manufacturing sectors noted above, as well the under' ing factors giving rise to these differences.

3.2 Formal versus Informal Training

Formal (post-schooling) training involves firm provision of a structured program and typically takes place in a classroom, workshop, or apprenticeship environment. Informal training involves firm provision of an unstructured program that easily adapts to circumstances. It often includes on-the-job training, mentoring, or shared learning-by-doing.

Smaller firms provide less specific and less formal training (Black, Berger and Barron, 1993) and tend to employ less skilled workers (Oi and Idson, 1999). Larger firms provide more employer-sponsored training, presumably because they prefer to train their more able employees. Altonji and Spetzer (1991) and Lynch and Black (1995) find that workers with higher levels of education tend to have greater access to training and tend to train more. Betcherman et al. (1997) and Jennings (1996) find that the gap in employer-sponsored training between the more educated (skilled) and less educated (unskilled) has been growing, which is consistent with the finding in Canada that university graduates are more likely to succeed at training (Leckie et al. 2001).

(i) Formal and Informal Training in Human Capital Formation

Kuhn and Sweetman (1999) define two types of general human capital. The first is general human capital that is of value inside and outside of the current firm. The second is general human capital that is of value primarily outside the current firm. They argue that workers employed at firms with higher turnover rates (as we have previously noted, smaller firms) are more likely to invest in general human capital that is of less value at

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[17] For evidence on this outcome see Altonji and Spetzer (1991).

[18] For example, in the decades following WWII, in key Canadian industries such as the resource sector or manufacturing, many large corporations employed a large number of highly educated workers in sizeable research and development divisions of the companies. While this still occurs, the change to increased networking and consortia, especially across firms, governments and educational institutions, combined with the rise of smaller, niche research and development firms, has probably altered the skill mix across firm size.

the current firm. On the other hand, workers at firms with lower turnover rates (larger firms) under-invest in general human capital that is of value outside the current firm.

Consistent with the Kuhn and Sweetman hypothesis is the Black, Berger and Barron (1993) finding that smaller firms provide more general training and informal training. Although informal training activity is popularly recognized as an important aspect of firm-level training, we have little systematic evidence regarding the nature of informal training. It appears, though, that general training is more efficiently delivered by informal training.

(ii) Changes in the Composition of Formal versus Informal Training Activity

Data for the United States suggests that the incidence of formal training has risen more sharply than informal training between 1983 and 1991. In fact, the relative importance of formal and informal training appears to have changed. Among all workers, the incidence of informal training was higher than the incidence of formal training in 1983. In 1991 the incidence of informal training was lower than the incidence of formal training. [See Lynch 1998, Table 12.2]. Given that smaller firms provide more general training and informal training these results are consistent with the decline of small manufacturing establishments found by Baldwin et al. (2002).

(iii) Training and Worker Characteristics

A recognized stylized fact is that on-the-job training declines with worker age. For example, Betcherman et al. (1997) find that the incidence of training increases with age up to the age of 45 and then declines. This type of finding makes sense because younger workers have a longer time horizon over which to reap the returns of training investments. This incentive for early investments holds for both the firm and the worker.

From the worker's perspective, since age and seniority are correlated, as are wages and seniority, the opportunity cost of devoting time to training is higher for older than for younger workers, all else being equal. Black, Berger and Barron (1993) find, for example, that training increases with firm size for experienced and highly educated workers. However, among the inexperienced, and the less educated, training does not increase with firm size.

(iv) Formal and Informal Training and the Unit of Analysis

An important issue, which we noted above, is the distinction between firm size and establishment size. An establishment is usually defined as the basic unit of production and often corresponds to a plant. Firms, on the other hand, may be single or multi-establishment.[19] The issue that arises is what is the appropriate unit of analysis for considering issues related to training and firm size?

[19] A firm is a legal entity.

The correct unit of analysis may depend upon where the primary responsibility for training decision lies. Informal training decisions, made at the establishment level, permit more flexibility for adjustment to local needs and conditions. Alternatively, formal training decisions, made at the firm level, can provide for better coordination of training policy across establishments. This issue of the level of analysis needs to be given greater attention in order for policy to be targeted in the most effective manner.

4. Firm-Level Institutional Considerations in Training

Institutional considerations within firms can have a major impact on whether or not training occurs. For example, institutional arrangements may affect the availability of internal training resources, or employee participation in outside training may be limited as a result of the nature of the internal operations of the firm. Appreciation of the importance of organizational arrangements, changing workplace characteristics, and differences in organizational characteristics across firms is important in understanding differences in training among firms of differing characteristics, especially firm size. It is equally important in gaining an appreciation of what types of policy designs may work best in practice.

Understanding evolving firm production systems is essential to understanding training requirements because technology can affect skill requirements directly. Firm level training activity (incidence and intensity) also occurs within an established institutional context and is defined by the characteristics of the employment relationship, the organization of production and work including human resource practices, and whether or not the workers are covered by a collective agreement. Each of these dimensions can affect training investment decisions within the firm and whether or not public policies aimed at encouraging training at the firm level will have the intended affect.

4.1 Changing Organizational Structures and Workforce Configurations and Training

One characteristic of larger firms relevant to training is that they tend to rely upon internal labour markets for the development of human capital. Large firms with integrated production processes and workforce will develop an organizational structure in which they will hire workers at "ports of entry" at lower wage/skill levels. Subsequently firms observe the match quality, invest in formal training as job tenure of workers with good match quality increases, and promote workers through the organization. Such firms will invest in informal training that may be firm-specific in emphasis and that reflects the firm's need for workers with skills that match both the "production technology" requirements and the "organizational technology" required of a large firm.[20] Quits among longer-tenured workers can therefore be costly to large firms, which therefore have an incentive to offer "above-market" wages to reduce quits.[21]

This traditional portrait of large firms has been significantly complicated over the past several decades. Under an array of pressures arising from increased competition and technological change, large firms have undergone significant organizational transformation. At the risk of understating the degree of heterogeneity of organizational forms that appear to coexist, one can illustrate the changes by considering one stylized description of the "new" structure that centers on the idea of a core-periphery model of

[20] Organizational technology refers to the design of the organization and its components, production and work systems, and employment systems.
[21] This argument follows from Oi (1991 and 1983).

employment. This model includes, on the one hand, a core workforce of more skilled, highly trained, well-paid workers that is augmented, on the other hand, by workers with less attachment, lower pay and, typically, less access to employer-provided training.

While a fuller characterization of emerging organizational structures and their industrial relations and human resource management implications are thoroughly provided elsewhere, it is important to note that there appears to be insufficient research available to allow us to rigorously characterize the mix of organizational models or structures across the economy, or within sectors or industries. For our purposes, it is sufficient to highlight several of the types of issues that have emerged from these developments. First, it may be misleading to think in terms of an "average" training level at a large firm, when in fact the access to human capital formation may be highly segmented, between white-collar and blue-collar, management and non-management, or full-time versus contingent..

Second, since large firms now tend to subcontract to workers, contract out, and outsource to a much larger extent, the boundaries around what constitutes the firm's workforce has become increasingly blurred. An example of the type of expected difference in training profiles between core and periphery workers is depicted in Figure 1. Core workers have access to training, and for reasons pointed out above, we anticipate their access to training to increase with firm size. This is expected, holding constant the workers level of education.

In contrast, we expect contingent workers to be provided with some initial training regardless of firm size, ranging from orientation to job-related training. Beyond this, their training may be somewhat higher in larger firms; however, due to the nature of the contingent employment relationship itself, the firm is simply not investing in the worker. After all, the flexibility associated with contingency implies that neither party expects a long-term attachment and production is organized in such a way that turnover of these workers does not adversely affect production. For these workers, we expect a positive but very small slope on the training-firm size profile.

We also know that these broad organizational developments are occurring in firms in both Canada and the United States.[22] The characteristics of these changes appear, in many respects, remarkably similar, and follow the description afforded above. On the other hand, the importance of transnational organizations, the rise of internationally linked production systems (for example, the international supply chains in the auto industry), the diffusion of types of production systems (for example, those utilizing "lean production" or "just-in-time approaches) and the diffusion of "organizational technology" suggests that this convergence is, in fact, what we might expect.[23] This would suggest that we ought to expect greater similarity across large firms, especially trans-nationals, in employer-provided training over time.

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[22] Firm-level evidence for Canada is provided in a series of studies in Verma and Chaykowski (1999); Betcherman and Chaykowski (1996); and Betcherman et al. (1994). Evidence for the U.S. is provided by, among others, Cappelli et al. (1997).

[23] Appelbaum and Batt (1994) and Katz and Darbishire (2000) discuss worldwide changes in production and employment systems

We would also expect that convergence along these dimensions would be substantial between Canada and the United States, in view of their extensive economic and corporate linkages. We also would expect a significant influence of American management education and practices on Canadian management education and approaches to human resources management within firms. It follows that these cross-border influences are expected to be stronger amongst larger firms than smaller ones.

One major but as yet unanswered question is the extent of international (especially American) influence on employer-sponsored training in large Canadian establishments with significant cross-border corporate linkages or extensive trade relationships. Another important, but unanswered, question concerns the diffusion of high performance human resource management practices both within Canada and between Canada and the United States. The issue is whether or not there exists an analog to "border effects" in trade?[24] That is, do human resource practices that rely upon skills development and training diffuse within economic regions (such as the Great Lakes region of Canada and the United States) regardless of national or provincial/state borders, or does the existence of a border have a chilling effect on the diffusion of such practices? Increasing our understanding of this type of dynamic would assist in improving the target and design of training-related policies.

4.2 Organizational Technology, Organizational Capital, and Training

(i) Organizational Technology and Training

One key aspect of organizational change in the past two decades has been the increased importance placed on innovations in work organization and human resource practices in order to increase productivity. The sets of practices that firms have focused on include: various practices that increase flexibility in the deployment of factor inputs (e.g., job rotation, multiskilling or teams); employee involvement in the operation of production systems; flexible pay systems aimed at increasing the link between pay and productivity or, in other cases, allowing the wage bill to adjust to changing business conditions; and a much greater emphasis on skills training.

Taken together, when implemented, these types of practices are referred to as "high performance work systems" because of their impacts on productivity.[25] The research literature emphasizes the importance of training as a key component of high performance work systems in its own right, but it is also an "input" into other practices. For example, training is typically required to create teams, improve communication, or devolve managerial authority down "to the line." This latter role for training is linked to the concept of "organizational capital," which we consider below.

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[24] See Helliwell (1998) and McCallum (1995).

[25] There is mounting evidence of the positive impacts of these practices on productivity, especially when these practices are bundled; see Bartel (1994), Lynch (2000), Huselid (1995), and Ichniowski et al. (1997).

It appears that large firms are investing more in high performance work practices and in attempts to obtain the benefits of broader systemic organizational changes. This is consistent with their higher likelihood of having internal labour markets and scale that makes this type of change beneficial. We have little in the way of evidence on how these practices vary by firm size or the important distinction between training aimed increasing worker productivity in their own job versus training aimed at facilitating organizational change. There is also little evidence on the implementation of other high performance work practices – and how these different training investments vary by firm size.

(ii) Organizational Capital

The importance of the emerging concept of "organizational capital" has recently attracted increased interest, although a precise definition of the scope of organizational capital has yet to emerge (Black and Lynch 2002: 2,3).[26]

> "… as with other intangible assets, there is no consensus definition of what this organizational capital is, how to measure it, or how to best quantify its contribution to output (either current or future). Unlike physical capital, its value does not appear on the balance sheet of a firm and when firms undertake substantial organizational change or re-engineering this is typically treated as "consumption" rather than an increase in the assets of a firm. There is no "market" for organizational capital that we could use to generate a book value for it and unlike general human capital it is not portable … We divide organizational capital into three broad components – workforce training, employee voice, and work design (including the usage of cross-functional production processes)."

Employer sponsored training – including training in supporting organizational practices – has been identified as a key element of organizational capital. In the spirit of Black and Lynch (2002), we also place considerable emphasis on the importance of investment in human capital and, especially, in training that supports and fosters the development of "organizational capital."

Training is a critical component of organizational capital because it supports the processes by which the organization functions, the structures of work and production within the firm, and facilitates organizational change (or adaptation). We expect that training requirements for these purposes of work organization, or employee voice, may be greater for more highly educated workers because we expect that they are more likely to be utilized by them. We have, however, little in the way of evidence or insights into the importance of organizational capital in smaller versus larger firms.

We also expect that organizational capital may develop nonlinearly in relation to firm size. We conjecture that as firm size increases, the amount of employer investment in training will increase: training investments are expected to increase at a relatively low

[26] Black and Lynch (2002: p.3, fn 1) report that the value of organizational capital has been estimated to be as high as 2/3 that of tangible capital.

rate in small to medium sized firms; but in large firms, in which a number of important characteristics of internal labour market apply, and at the point where work systems are a key aspect of production systems, then the importance of organizational capital increases more rapidly. For such large firms, the increase in training required to support the various organizational practices, ranging from teams, to cross-skilling, to decision-making, as examples, will increase quite significantly. This relationship is depicted in Figure 2.

We also expect that the importance of the contribution of training investments to the development of "organizational capital" will vary between core and contingent workers as well, but less so than across firms of different sizes. (Refer to Figure 3.) We expect the core, or primary, component of the workforce to have greater training investment than the contingent component of the workforce, at each firm size. In large firms, though, even contingent workers may require some training to support other aspects that contribute to organizational capital; although the employer would, by virtue of the intended contingency nature of the employment contract, be restrained in its training investments.

These considerations, taken together with standard economic explanations, form a fairly complex picture of employer training in firms. There appears to be an under-appreciation of the importance of the magnitude of the training investments committed to building organizational capital – and we appear to be only now exploring the importance of organizational capital itself. This whole area begs further research in the form of both case studies and utilizing large-scale data sets.

5. A Portrait of Training and Firm Size

This section provides a basic description of the stylized facts regarding employer-based training and firm size in Canada and internationally. In our descriptive characterization of employer-based training activity, we draw upon several key data sources, including the Workplace and Employee Survey for Canada and the OECD International Adult Literacy Survey for an international perspective and to situate the Canadian results in the broader context.

A fairly large body of research evidence is available regarding the relationship between training and firm size, although the majority of this research is based on American data and much of the evidence arises in the context of studies for which the focus of the analysis are issues other than firm size and training. Taken together, these studies nonetheless provide a fairly comprehensive and consistent picture of the main characteristics of the training-firm size relationship. We therefore concentrate our review of the results of major Canadian and United States studies.

5.1 Training and Firm Size in Canada

The basic established result that employer-provided training increases with establishment size are illustrated by the available data for Canada. In Table 3, in we present results from Turcotte et al (2003). We supplement these results with further tabulations based upon the employer-side survey from the WES and which are presented in Tables 4 through 7.[27] The numbers reported in the tables are the percentage of firms in the employer sample that responded that they offered training or offered training of particular types. Table 4 provides essentially the same descriptive results as does Table 3 but differs from the analysis in Table 3 in that we used a different set of establishment size categories by design in order to address explore the sensitivity of the results to definitions of size.[28] The results in Tables 3 through 8 yield several broad regularities regarding training and firm size, the content of training, and institutional characteristics.

(i) Training and Firm Size:

- Regarding classroom and on-the-job training, the proportion of establishments offering training increases with establishment size, although the proportion offering on-the-job training is higher at each establishment size.

- Smaller establishments are less likely to support training. A relatively similar proportion of employees across establishment-size categories participate in employer supported training among establishments that support training.

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[27] In the tables, "classroom or on-the-job" includes those employers offering classroom training, on-the-job training, or both types of training. There were no data restrictions placed on the employer sample.

[28] Using an alternative set of size definitions allows us to see how sensitive the results are to the establishment size cutoffs used to define the categories of small, medium and large.

(ii) The Content of Training:

- Given establishment size, there is considerable variation in the proportion of employers providing different training content (subjects), for classroom training, on-the-job training and for both/either types;

- The proportion of employers providing different training content (subjects) for classroom training, on-the-job training and for both/either types increases with establishment size for all subjects. The one exception being sales and marketing training for which the proportion is largest among medium sized establishments;

(iii) Organizational Considerations:

- Training in skill areas related to organizational practices (e.g., team-building or leadership) is more prevalent in large establishments.

- Establishments offer more training if the workplace is undergoing change. This is particularly true for smaller establishment support of training.

5.2 Canadian and American Evidence from Studies of Training Activity

Canadian studies that include an analysis of firm (establishment) size and employer-sponsored training tend to make use of a variety of cross-sectional data sources and most results relate to the 1990s. Most of the studies approach employer-sponsored training from the perspective that it is a form of human capital formation that yields labour productivity returns. There have been some attempts to discuss the incidence and level of employer-sponsored training in the context of organizational production and work systems and this research consists of instiutional analyses.

While the results arising from the AETS tend to focus on individuals, they do, nonetheless, provide evidence on employer-sponsored training from the employee perspective. These studies also place employer-sponsored training in the context of other types of formal adult training, enabling a more comprehensive picture of human capital formation to be formed. In Canada, the WES is the only publicly available survey to permit a linked employer-employee perspective on training activity, over time.

An earlier Canadian survey – the WTS – was undertaken as a part of the broader examination of changes in human resource management and industrial relations practices in Canada, and was therefore aimed at a more general level. It was important, however, because it placed employer training in the context of broader changes in organizational and workplace practices in Canada. This is critical because it highlighted the role of emerging systems of organizational practices in training (among other) outcomes. As we emphasized in Section 4, institutional arrangements are important to account for in considering trends and differences across firms in training. We suggest that carrying

forward this broader, policy-oriented research, in the context of training activity in firms. The WES may be the data foundation for this type of research.

A number of surveys in Canada have provided evidence that supports the notion that training generally increases with firm (establishment) size. The characteristics and major results arising from Canadian studies are presented in Chart 1. The major findings include:

(i) With respect to incidence:

- Training increases with worker education level and tenure;
- Classroom training increases with firm size;
- On-the-job training tends to increase with firm size;

(ii) With respect to training intensity:

- Duration of formal training increases with firm size;

These results are consistent across Canadian studies and broadly consistent with studies for other countries and, particularly, the United States (for example, Idson (1996), Holtman and Idson (1991) and Barron, Black and Loewenstein (1987)). These United States studies are interesting, also, as some of the more detailed findings raise a number of issues and highlight the complexity of the firm (establishment) size – training issue.

For example, firm size is associated with new skills training (Lowenstein and Spletzer (1999)), but is not associated with training among young white-collar workers (Bronars and Famulari (1998)). Importantly, Black and Lynch (2002) find that new methods of training, and training associated with work organization (e.g., teamwork) as being positively associated with firm size. This latter result again points to the importance of firm organizational practices in determining training activity.

We know that, along a number of labour market dimensions, "small differences matter" (Card and Freeman, 1993). This appears to hold in the area of training as well. Lluis (2003) finds that the returns to education are higher at larger firms relative to returns at smaller Canadian firms; however, the returns to experience are not statistically different at large versus small firms in Canada. On the other hand, Lluis (2003) finds that the returns to experience are higher at larger U.S. firms, but the returns to education are not significantly different at large and small U.S. firms. We need a better understanding of how these "small differences matter" in terms of training outcomes.

In both countries, these results are, however, sensitive to union status. In the nonunion sector, Lluis (2003) finds the returns to experience are higher at larger firms. In the union sector, smaller firms appear to have a higher return to education than do larger firms. Private sector unionization remains at a much higher level in Canada compared to the United States, so these results suggest that any union effects on training may be operating similarly in both countries. Union coverage is quite high in Canada, but it varies by both

firm and establishment size. There is a dearth of research on the impact of unions on training activity in small versus large firms and establishments.

5.3 Training Results From International Data

Data from the OECD International Adult Literacy Survey (IALS) does allow some cross-country comparisons. In Tables 9 through 11 we present basic descriptive data from the IALS.[29] The survey question underlying the data takes account of both adult education and job-related training and includes both employer and employee paid training.[30] Tables12 and 13 presents IALS descriptive data with respect to employer-supported training for a number of countries. While the IALS data provide some insights into relative international training activity, there may be a variety of underlying factors that give rise to observed differences across countries.

(i) Participation Rates by Gender and Age

Comparing Canada and the United States, the participation rate in job-related training for employed men was about 5 points and for women was about 8 points (Table 9) higher in the United States. The differences are not statistically significant. The participation rates for men and women are similar although, in some countries, the rates a slightly higher for women. The general participation pattern by age is an inverted-U shape where older workers (aged 56-65) have lower participation rates than do young workers (aged 25-35). The participation rates are higher in the United States than Canada for each age group.

(ii) Participation Rates Among White- and Blue-Collar Workers

Across countries, participation rates are higher for white-collar workers than for blue-collar workers (Table 10). The United States has higher participation rates than Canada for white-collar workers, whereas Canada has significantly higher participation rates for blue-collar workers. In both Canada and the United States, the mean number of hours of education and training per employee was substantially higher for blue-collar workers than for white collar workers. The mean hours of training are higher in Canada than in the United States, particularly for blue-collar workers, where the mean difference is almost 100 hours higher in Canada.

(iii) Participation Rates By Firm Size

The IALS results by firm size (Table 11) reveal that, in general, small firms (less than 100) have lower participation rates than do large firms (500+). The participation at small

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[29] Care should be taken in interpreting the data given that institutional differences across countries can be quite significant. The data for Canada and the United States should be reasonably comparable, given the similarity in the training institutions of the two countries.

[30] The question asked was: "During the last 12 months, that is, since August 19xx, did you receive any training or education, including courses, private lessons, correspondence courses, workshops, on-the-job training, apprenticeship training, arts, recreation courses or any other training or education?" (Tuijnman and Boudard (2001)).

firms is higher in Canada than the United States; while at large firms the participation rate is higher in the United States. Interestingly, the participation rate at small (less than 20) Canadian firms is almost identical to the participation rate at large (500+) Canadian firms.

In terms of the mean hours of training per participant, small Canadian firms (less than 100) provided substantially more hours of training than do small firms in the United States; medium size firms (100-499) provided substantially fewer hours of training in Canada than the United States; and, large firms (500+) in Canada provided slightly fewer hours of training than in the United States.

(iv) Employer-Supported Training

Both the Netherlands and the United States have a high training incidence and intensity of employee-supported training. While the United States has a substantially higher incidence of employer-supported training than Canada, Canada provides more hours of employer-supported training per trainee, while hours of employer-supported training per employee are similar for Canada and the United States. Comparing Canada and the United States presents, then, a somewhat mixed portrait of the relative standing of the extent of Canada's employer-sponsored training activity in relation to the United States.

Future Research Areas Related to Employer-Sponsored Training

The growing body of research literature in Canada and the United States on training provides some basis for identifying the areas in which future research should be concentrated. This section identifies key priority areas for research in the area of employer-sponsored training that are relevant to the issues of why training activity varies by firm (establishment) size and whether firms with certain characteristics tend to under-invest in training. Themes emerging from the previous analysis and that follows in the form of a future research effort is that attention ought to be focused on establishment level determinants of training activity related to the costs and benefits of training, the relationship between institutional arrangements and training, why some workers tend to receive training and other do not, barriers to firm-level training, the provision of formal versus informal training, and what gives rise to different training outcomes across countries.

6.1 Sources of Variation in the Costs and Benefits of Training

We need to better understand how the costs and benefits (productivity or profitability) of formal and informal training vary across firms (establishments) of different size. Many factors that potentially affect the costs and benefits vary with firm (establishment) size. Smaller firms have higher turnover rates, have poorer access to credit or financial markets, are more likely to file for bankruptcy, and hire more low skilled workers. The effect of these factors on the training decision raises several specific research questions.

Research Area (i): Turnover and Training	
If smaller firms have higher turnover rates (lower levels of tenure), then smaller firms have a shorter time horizon over which the benefits of training accrue. Consequently, larger firms are expected to provide more training than smaller firms.	Relationship between turnover and training.
Smaller firms will tend to invest in training where the productivity benefits are realized more immediately.	Relationship between turnover and the type of training supported by the employer.

Research Area (ii): Training and Access to Capital	
If smaller firms have poorer access to financial markets then, all else equal, the opportunity cost of training is higher at smaller firms. Consequently, the benefits are less likely to outweigh costs at smaller firms.	Relationship between access to capital and training.

Research Area (iii): Informal Training, Mentoring, and Spillover Effects

Co-workers provide more training in larger firms. In smaller firms managers and supervisors provide the training. Consequently, the marginal cost of training is expected to be higher in smaller firms.	Relationship between presence of work groups, etc, and training.

Research Area (iv): Training and Scale Effects

Smaller firms cannot take advantage of "economies of scale" in training. All else equal, training costs are expected to be higher at smaller firms.	Relationship between training delivery modes within and outside the firm and training.

6.2 Training, Institutional Arrangements, and Organizational Capital

Smaller firms are less likely to organize production around teams, have an internal labor market, or adopt different human resource management practices. Institutional research also emphasizes the role of technology and technology adoption in the area of skills and training. Firm size may matter in terms of institutional arrangements because smaller firms are less likely to adopt new technology.

We need a better understanding of how institutional arrangements that vary with firm (establishment) size affect the training decision. Specific areas dealing with institutional considerations include:

Research Area (v): Training and Organizational Capital	
Training has been identified as a key element of the formation of organization capital within firms.	Relationship between training, work and organizational practices, and the formation of organizational capital.

Research Area (vi): Training, Work Organization, and Technological Change	
Certain (new) technologies are associated with certain organizational practices. The type and amount of training provided by the firm is likely to be closely related to how production is organized and the nature of the technological change.	Relationship between the types and amount of technological change and the incidence and intensity of training.

Research Area (vii): Skill-biased Technological Change and Training	
Recent technological change appears to have had a skill-bias leading to an increased demand for highly skilled workers. Larger firms may be better at solving the assignment problem possibly due to internal labor markets providing the firm with better information about worker productivity.	Examining the firms' problem of how much training to provide and then assigning the most efficient employees to work with the new technologies.

Research Area (viii): Human Resource Practices and the Efficient Provision of Training

The provision of formal training tends to require more coordination with other business strategies. Larger firms already have an infrastructure in place to provide this coordination of activities. On the other hand, smaller firms may more quickly respond to changes in product demand by providing more informal training in response to periods of slack demand.	Investigating which human resource management practices at larger/smaller firms may lend themselves to a more efficient provision of formal training.

6.3 Training Provision, Firm-Worker Match, and Training Investment Levels

We need a better understanding about which workers receive training and the nature of the skills imparted. Large firms provide more specific and formal training than do smaller firms. While larger firms provide more employer-sponsored training, they presumably prefer to train more able employees. Can the results of training studies at larger firms be generalized to smaller firms (who tend to employ less skilled workers)?

These results highlight the importance of improving our understanding of who does not receive training and why. Further, not all training is equally valuable. We need a better understanding of the type of training provided to less skilled versus more highly skilled workers, as well as the differences in the types of training provided by large firms relative to small firms.

Research Area (ix): General Training and Training Under-Investment	
Do smaller firms tend to invest in general human capital that is of less value at the current firm? Do larger firms under-invest in general human capital that is of value outside the current firm?	Relationship between firm size and the incidence, intensity and type of training provided with a view to whether small (large) firms under-invest in training.

Research Area (x): Training and Worker Characteristics	
Training is positively correlated with firm size for experienced and highly-educated workers; however, among the inexperienced, and less-educated, training does not increase with firm size.	Relationship between the incidence, intensity and type of training, the characteristics of establishment-level workforces, and firm size.

6.4 Barriers to Training

We need a better understanding of the barriers to providing training at small versus large firms. For example, financial barriers are presumably greater for small firms becauase they have poorer access to financial markets. Other possible barriers may include higher turnover rates at small firms and institutional constraints, such as limited access to outside training institutions or the limited availability of expertise inside the firm.

The 1993 Ekos National Survey of Employers on Training and Employment Issues and the 1995 Ekos Workplace Training Survey indicated that barriers to training are transient. However, it is still of interest to know whether certain types of market failures disproportionately affect small firms. From a policy perspective it may be as important, if not more so, to also identify which firms do not provide training and why.

Research Area (xi): Barriers to Training:	
Research has identified a range of different types of barriers to training, including barriers in financial markets and institutional barriers.	Examination of the types and relative importance of different forms of barriers to training in small versus large firms.

6.5 Role and Nature of Formal versus Informal Training

We need a better understanding of the relationship between informal and formal training. We need a clearer understanding of the nature of informal training, who receives it, and its inter-relationship with formal training activity as part of firms'/establishments' overall training investment strategy.

Research Area (xii): Appropriate Unit of Analysis	
What is the appropriate unit of analysis?	Investigation of which types of training (and why) are provided by the firm and which types of training are provided by the establishment.

Research Area (xiii): Informal Training Activity	
Although informal training activity is popularly recognized as an important aspect of firm-level training, we have little systematic evidence regarding the nature of informal training and who receives it.	Investigation of the nature of informal training activity in terms of types, prevalence and intensity.

Research Area (xiv): Changes in the Composition of Formal Versus Informal Training Activity	
U.S. data suggests that the incidence of formal training rose more sharply than informal training during the 1980s.	Examination of the relative importance of formal and informal training in small versus large firms, and whether there has been a change in the relative importance of formal versus informal training. If this is true, is the change in the relative importance of formal versus informal training similar for small and large firms?

Research Area (xv): The Role of Formal and Informal Training in Human Capital Formation	
Smaller firms provide more general and informal training. It appears that general training is more efficiently delivered by informal training. What types of general training are most efficiently provided with informal training? Are formal and informal training complements?	Investigation of the inter-relationship between formal and informal training activity in the process of human capital formation within firms.

6.6 Policy Regimes and Training Outcomes: International Comparisons

There is evidence that "small differences matter," between Canada and the United States, for example, regarding various aspects of their labour markets. We need a better understanding of how these "small differences matter" in terms of training outcomes. In particular, how do the differing policy regimes of Canada and the United States affect training outcomes? What are the key labour market and policy features that differ between Canada and other countries? How do these differences affect training outcomes? For example, key labour market differences include: differences in education and experience premium, earnings compression, the union wage premium, minimum wage levels, availability and types of benefits, and the composition of employment.

Research Area (xvi): International Comparisons	
Institutional and regulatory environments vary across countries. How do these environmental factors affect training outcomes and does the effect vary with firm size?	

7. The Nature of Existing Data Bases and Future Data Requirements

This section builds upon the identification of the key research issues identified above by considering the availability of data and the major data issues that ought to be addressed in order to undertake a broader research agenda on firm size and training. We begin by identifying the major data sets that are currently available in Canada that include firm or establishment level information on training activity. The first section considers the availability of data and data requirements necessary to address the types of research issues in the areas noted in Section 6. It also identifies some types of data that would be useful in order to better address training issues. Another focal point is on matters related to the ways in which existing data (such as the AETS and WES) can be better utilized to examine training activity in small Canadian establishments (firms).

7.1 Major Canadian Data Sets Incorporating Training

Five Canadian data sets have information on both employer-sponsored training and on firm size. In Table 14 we provide a concise summary of key characteristics for the major data sources (AETS and WES). The three types of surveys utilized are household, employer, and matched employer-employee.

Household surveys allow the researcher to examine the impact of post-school training on wages, while controlling for socioeconomic and demographic characteristics of individuals. Household surveys usually collect only limited information about firm characteristics, such as industry. Employer surveys allow the researcher to examine the impact of post-school training on productivity. Yet, they contain little in the way of information identifying which workers receive the training. The incidence and nature of the training received by workers is usually identified within broad occupational categories. Additionally, the measure of productivity is usually subjective leading to interpretation concerns.

In recent years, interest has grown in the development of matched employer-employee surveys that contain information on both the employer and the firm's employees because they permit the analysis of workplace-level outcomes from "both sides" of the labour market. In the current context, these data sets would, at least in principle, allow the researcher to examine the effect of training on both firm level outcomes of interest (such as productivity or profitability) and worker wage. Considering both the employee and employer side of training also reflects the fact that training investment decisions involve the two agents: the worker and the firm.

In Appendix A we briefly summarize employer-sponsored training information contained in each of the five surveys[31]. A broader summary of surveys containing information on training and education is contained in Rogers and Shipley (1997).

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[31] Appendix A also contains a brief description of forthcoming changes to SLID that will allow limited examination of employer supported training. The IALS is useful for comparing training in the U.S. and Canada.

7.2 Key Data Issues in Empirical Research in Training

(i) Investigating the Returns/Benefits to Training

Incidence, duration, and cost of training can only provide a descriptive picture. Perhaps more importantly, we need to focus on the implications of training for worker wages, firm productivity and profitability in order to assess whether or not the training investment is an advantageous one. Presumably training investments are made by workers and firms to improve their own welfare. Investment in training will only occur if the benefits of the investment out-weight the costs. The benefit to workers, according to human capital theory, is higher wages. The benefit to the firm is increased productivity – allowing the firm to more effectively compete and thereby raise profits. Although usually not available, when determining the effect of training on wages, it would be useful to control for prior investments made by the worker, at the current and at previous firms.

While we have a variety of measures regarding training activity (e.g., incidence or intensity), we have little in the way of micro-level data or other information from large-scale surveys regarding the returns to training for firms, or outcome measures such as productivity or profitability. We have some anecdotal evidence that larger firms collect some of this of data. For example, they may be able to bring together information on the worker costs of training, output, and in some cases establishment-level productivity. Case studies aimed at utilizing this type of administrative data would therefore be useful. This suggests a need for systematic case study approaches that incorporate the collection of detailed information about training activity (investments) and workplace outcomes across firms (perhaps firms of different sizes within an industry).

(ii) Emphasis on Exploiting Matched Employer-Employee Data

Matched employee-employer data is probably the most useful data to use to examine the issue of firm size and training. At a minimum, average worker characteristics can be controlled for in the analysis. Abowd and Kramarz (1999, 2695) state:

> "…[t]he potential of matched employer-employee data to address issues surrounding training is enormous. Indeed, we believe that questions such as the identification of general versus specific knowledge can only be addressed with such longitudinal datasets. And movements of workers between firms, workers for which we measure most individual characteristics would help isolate those firms which provide firm-specific training on one side and those firms which provide general training on the other."

The WES is perhaps the one survey in Canada that attempts to capture measures of establishment-level outcomes potentially arising from training. Better measures of productivity and profitability (the benefits of training) in matched data would be a particularly fruitful combination.

(iii) Classification of Training

Following a suggestion by Green and Lemieux (2001), we need to have a better understanding of how to classify various types of training. Specifically, the researcher would benefit from being able to distinguish between different types of general human capital as well as between general and specific human capital.[32] It would also be useful for classifying and distinguishing between the nature of trade skills training, management/supervisory training and "retooling" training received by workers or provided by firms. Classifying training is also important when we consider issues such as the impact of the training on firm-level outcomes or in assessing the costs/benefits of training.

(iv) Refining or Redefining Small, Medium and Large?

How do we define small, medium, and large firms? For example, categories of 1-19 and 1-49 employees have typically been used to define a small firm. All categorical analysis requires some aspect of arbitrary cutoffs to define the bounds of categories. This is one issue that can be addressed through sensitivity analysis. It is potentially an important one, because of the differences in trends noted earlier across size categories, but also because the differences in training activity and outcomes may be more meaningfully explored if the full distribution of firm sizes is considered.

There are other issues that are somewhat more complex. In particular, we are concerned that the concept of firm (establishment) size, relying upon a definition around the number of employees, may itself have become somewhat fuzzy, in view of the emergence of the core-periphery distinction in larger firms. This is important because definitions of firm size that are based on all employees may obscure the fact that, in larger firms, workers in the core are the ones for which many training decisions matter most (from the employer viewpoint), while for employees training matters, especially in the long run, regardless of the precise nature of the employment relationship. This raises another issue that relates to what is the relevant basis of comparison with smaller firms – the core workforce or the total workforce?

In addition, analyzing training activity and outcomes along other size dimensions (other than the labour force) may yield quite different results and implications. For example, the definition of large versus small may be different in the manufacturing sector than the non-manufacturing sector if measures of assets, for example, are used.

Another important issue emphasized above is at what level of the organization is the training provided? Is it provided at the firm-level or at the establishment-level? If it is most plausible to think of on-the-job training (or informal training) as occurring at the

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[32] For example, Green and Lemieux (2001, 20) pose questions that would help researchers distinguish between general and specific human capital, such as:

> "is this training useful in firms outside your current firm? outside your current industry?" "Is it useful inside your current firm?"

establishment-level, then the establishment may be the relevant unit of analysis, and large-scale data sets such as the WES, or case or industry-level studies, may be necessary.

(v) Focusing on Training Over Time

Training benefits accrue over time. To date, virtually all analyses of training activity have utilized cross-sectional data sources. We need longitudinal data to capture the investment as well as the benefit stream. In addition, certain training outcomes of interest have an intrinsic time dimension, especially with regard to the formation of organizational capital. These considerations highlight the importance of utilizing data such as the WES, which is now at the stage of having available a significant longitudinal dimension.

8. Policy Issues Associated With Training and Firm Size

The basic policy question is whether or not small firms under-invest in training? We began our review by considering firm size and labour productivity. We found that both shifts in product demand and technological innovation are important factors that could affect training by firm size. In the case of changes in product demand, shifts in demand would be expected to affect the quantity of labour demanded, which could increase the amount of employer-supported training as firms expand their work forces. Technological innovation could change both skill levels and mix within firms, as their size changes, and this could, in turn, be associated with changes in the extent of employer-sponsored training activity.

The level, amount, and type of employer sponsored training undertaken in smaller versus larger firms may be related to the different benefits and costs of such training across firms of different sizes. Differences in the cost-benefit ratio could, in turn, depend upon such factors as differences in turnover, or access to capital. Determining how these factors vary across firms would be a critical component of a research agenda on firm size and training. While these types of issues fall more squarely in the conventional domain of economics, there are also a host of institutional considerations that could affect training activity in firms of different sizes. Our discussion emphasizes the importance of firm-level training as part of an organizational strategy aimed at achieving organizational outcomes. Differences in organizational structures and strategies across firms of different sizes may therefore explain some of the variation in training activity across firms.

We have identified the high potential value of data sets such as the WES in furthering a more comprehensive research agenda on training and firm size. We also emphasize, however, the value of supplementing large-scale data sets with analyses based on industry or firm-level case studies in order to account for the affects of organizational/institutional factors on training outcomes and to obtain detailed firm or establishment level (administrative) data not otherwise available. In view of these considerations, we propose a fairly comprehensive set of research areas including sources of variation in the benefits and costs of training, the relationship between institutional arrangements and training outcomes, who receives training and who does not within firms of different sizes, barriers to training in small versus large firms, the nature of formal versus informal training in small versus large firms, and the impact of alternative policy regimes on training outcomes.

The available empirical evidence for Canada and the United States confirms the training – firm-size relationship. Beyond this empirical regularity, our knowledge drops off quickly. There are general issues that arise from broader labour market trends in the two countries. For example, in both Canada and the U.S., employment growth has been concentrated in the service sector (Sharpe, 2001). The policy implications of the nature of the composition of this employment growth, and how it is concentrated in smaller versus larger firms in the service sector, begs further exploration.

Despite Canada-US economic integration, both in broader macroeconomic terms as well as among trans-national corporations, there may be systematic differences in the operation of labour markets and in firm-level institutional arrangements that leads to some of the different training outcomes observed in Canada and the United States. We have insufficient information, though, about whether or not the functional form of the training firm size relationship differs between Canada and the United States, or whether training incidence and intensity across firms of similar sizes, all else equal, differs across countries. Some variation in training outcomes may also be related to differences in existing policy regimes between the two countries, raising the issue of what types of existing policies tend to enhance training activity and intensity, especially amongst smaller firms. We also know little, in a comparative sense, about the nature of impediments to training in the two countries. Nor do we understand the relative importance of different types of market failures in the area of training investments. Each of these issues suggests a research agenda to support policy formulation.

In approaching the issue of training and firm size from the perspective of what is an appropriate policy, there is often an embedded concern that there may be some form of market failure that may give good reason for some form of government involvement. Traditional policy approaches have often involved direct government intervention. This intervention is in the form of government run programs. It may also be a somewhat more indirect intervention in the form of government support for existing private sector (e.g., establishment level) initiatives. In other cases, government policy may involve influencing other types of institutional arrangements in the labour market that, in turn, affect training outcomes.[33] Government policy towards sectoral councils, or more indirectly still, toward unions and unionization, would fall into this category - the former being more direct than the latter. Whether the intervention is direct or indirect, some current thinking emphasizes the value of designing labour policies in ways that complement the market-generated outcomes in order to minimize undesired (efficiency-related) side effects (e.g., Chaykowski and Gunderson 2002).

Appropriate policy in the realm of training therefore involves two broader sets of considerations.[34] The first concern is the *degree* of policy intervention. The second policy concern is what *form* of government intervention would best promote the desired training outcomes? Both of these questions, as applied to training, would benefit from further research.

(i) The degree of policy intervention. The degree, ideally, depends upon being able to clearly identify the extent of the market failure that the policy is aimed at addressing. Too much policy intervention may yield undesired consequences by "running up" against market forces; too little may also simply worsen the outcome as opposed to "lessening" the market failure. Stated differently, in the presence of a second best outcome, one may

[33] On unions and training refer, for example, to Gervais (2002), Green et al. (1999) and Chaykowski and Lewis (1994).

[34] Appropriate policy also involves significant social and political considerations that we stress as being of critical importance to address, but which are beyond the scope of this paper.

not be able to determine, *a priori*, whether or not the policy intervention will move outcomes to a "first best."[35]

(ii) The form of government intervention. The question here is what form would best promote the desired training outcomes? For example, there is evidence that the ratio of on-site training to off-site training is higher in larger firms. This may be especially important given that technological advances often result in firms downsizing their workforces (increased efficiency of smaller firms). In addition, since the 1970s, the industrial composition has shifted away from the goods sector towards the service sector, where firms tend to be smaller. A possible role for government policy may be to develop some form of training subsidy or incentive, for example, at smaller firms. Black, Berger and Barron (1993) find that small firms provide more informal training and large firms provide more formal training and that formal training is more costly than informal training. Would better access to financial markets sufficiently lower costs at small firms and result in the provision of more formal training? Can government sponsored programs improve access? These types of examples suggest a role for government in more direct forms of policy intervention, but there may be other more indirect roles as well that government can play.

Regardless of the form of policy contemplated, the increased complexity in work organization, employment systems, and organizational structures suggests that policies may need to be more refined and more targeted in order to avoid the "mismatch" problem noted above. For example, the emergence of the core-periphery distinction in larger firms is important because conventional policies aimed at establishments may not account for the fact that, in larger firms, workers in the core are the ones for which training decisions tend to be relevant (from the employer perspective).

Yet this also raises an important and related policy issue concerning whether or not workers in the periphery are unable to obtain sufficient workplace training in order to improve their labour market position. Has growth in part-time employment, or contracting out – that is, growth in a periphery – disproportionately occurred at smaller firms? Knowing this is important because we also know that prospective employers place some value on workers' labour market experience in "good jobs." Incorporating information about new institutional arrangements in employment, such as the development of core and peripheral components of workforces, into analyses of issues concerning training and firm size will likely both enrich the research agenda and benefit the policy analysis.

[35] This argument is in the spirit of Richard Lipsey's "Theory of the Second Best."

Appendix A
Sources of Canadian Training Data

Below we provide a brief description of Canadian training data. We have restricted our attention to data sources that also contain information about firm or establishment size.

Main Data Sources

The most comprehensive coverage of education and training activities of workers and firms is provided by AETS and WES. Both data sets allow for longitudinal comparisons.

Adult Education and Training Survey (AETS): Household Survey

This survey was first conducted in 1984 under the name Adult Education Survey (AES). To reflect the change in survey content the second survey name was changed to Adult Training Survey (ATS) in 1986. The AES and ATS were combined in 1990 to form the AETS. Between 1990 and 1992 major revisions of the AETS survey content was undertaken. Consequently, valid historical comparisons are restricted to the 1992, 1996, and 1998 AETS.

The AETS (a LFS supplement) collects information on formal adult education and training in Canada. Beginning in 2003 AETS will also collect information on informal training. The survey contains information on the incidence and duration of training; socioeconomic and demographic information about individuals regardless of whether they participated in a training program; limited information on employer characteristics; and information on barriers faced by individuals to receiving training.

The target populations were individuals aged 17+ prior to 2003 and individuals aged 25+ as of 2003. Questions were added in 2003 that more closely examined why individuals did not participate in training. Questions were also added regarding past (last 5 years) job related training undertaken by individuals.

Workplace and Employee Survey (WES): Matched Employer-Employee Survey

WES is a matched employer-employee establishment-level survey that contains socio-demographic information on workers and on establishment characteristics. The survey is available for the years 1999, 2000, and 2001. The matched or linked aspect of WES allows the researcher to follow workers for two years and firms for six years.

On the firm (establishment) side, information was collected about the number of employees receiving formal and informal training; the nature of the training provided; and, the costs of formal training provision. In addition, WES also contains information on the number of employees trained, the usual duration of training, and the cost of training provided in response to recent technological changes. It is also possible to identify new employee orientation training from other types of ongoing training. On the worker side, WES contains information about the incidence, duration, and nature of formal and

informal training received by workers. Additionally, the survey contains information on training received by workers in response to recent technological change.

With respect to the outcomes of training WES has information about the worker's wage and information about establishment productivity and profitability. Unfortunately, the productivity and profitability measures are subjective.

Supplemental Data Sources

There are three one-time surveys that contain information about education and training. These data sets contain supplemental information and may be useful when used in conjunction with the AETS and WES data sets.

Survey of the Cultural Sector of the Labour Market: Household Survey

This (retrospective) survey contains information about training received by workers between the years 1988 and 1993. The sample is restricted to individuals employed in the administrative, professional and technical occupations; and employed in the arts, cultural and heritage industries. Socioeconomic and demographic information and limited information on employer characteristics was also collected.

Human Resources Training and Development Survey: Employer Survey

This survey collected information about formal training taking place in private industry in 1987. The survey contains information on firm characteristics; the number of employees receiving training; and, training expenditures and needs. There is limited information about average characteristics of the firm's workforce. The focus of the survey was on human resource planning and training activities undertaken by the employer. The target population was Business Register establishments, excluding government services, education services, health and social services, religious organization and political organizations.

Survey of Growing Small and Medium Enterprises: Employer Survey

This survey collected information about training investments made in growing small and medium size firms between 1984 and 1988. The sample is restricted to firms with fewer than 500 employees and less than 100 million in assets in 1984. The survey referred to training investments for the reference period of 1989, 1990 and 1991. Information on training expenditures; the number of trainees; and, the impact of training on the company was collected. The target population was all sectors save public administration.

Other Data Sources

There are two other data sets that may be useful in examining training issues. SLID provides the most comprehensive information for labour market transitions. IALS allows for international comparisons.

Survey of Labour and Income Dynamics (SLID): Longitudinal Household Survey

Beginning in 2003 SLID will collect information on the most important training activity of the previous year as deemed by the respondent. Information will be collected on the duration (hours) of the training, whether the training was employer supported and whether the training was related to current or future job requirements. The target population is all persons aged 16+, excluding the Yukon, NWT, people living on reserves and full-time Armed Forces personnel. Although the employer supported training information contained in SLID is very limited, the data may be useful for examining the relationship between labour market transitions and training.

International Adult Literacy and Skills Survey (IALS): Household Survey

The IALS and presumably its successor ALL (which becomes available in 2004 or 2005) is useful for comparing the U.S. and Canada. It is a 22-country household survey of individuals aged 16+ conducted between 1994 and 1998. Although the survey was primarily designed to examine how well adults used printed information, it also contains information on the incidence of adult education and training.

Appendix B
Key Discussion Issues Relating Research Gaps and Further Research Priorities

What is the nature of the relationship between turnover rates at smaller versus larger firms, average job tenure, and the incidence and intensity of training provided? What is the impact on the type of employer-sponsored training offered?

Do small firms tend to provide training that is more efficiently delivered by informal training? What types of training are most efficiently provided with informal training? Do scale effects matter?

How do institutional arrangements that vary with firm size affect the training decision? Across firms of different sizes, what is the nature of the relationship between work organization and work practices, on the one hand, and the incidence and intensity of training and the types of training provided, on the other hand?

Are smaller firms less likely to adopt technologies or forms of work organization that require higher levels of training? Do larger firms tend to undertake technological change that has a skill-bias leading to an increased demand for more skilled or more highly skilled workers? Are small firms less efficient at training and assigning the most efficient employees to work with the new technologies?

Which workers receive training and what is the nature of the skills imparted? How does the relationship vary with firm size?

What are the barriers to providing training at small versus large firms? Who does not receive training and why?

Is the change in the relative importance of formal versus informal training similar for small and large firms? Are formal and informal training complements or substitutes? Does the degree of complementariness vary by firm size?

Does the appropriate unit of analysis (firm versus establishment) depend upon the type of training? How?

What are the key environmental (institutional and regulatory) factors that affect training and how are they related to firm size? Are the factors different in Canada than in the United States?

How do the costs and benefits (productivity or profitability) of formal and informal training vary across firms of different size? Is it necessary to collect better measures of productivity and profitability? Is it necessary to collect time series data?

What is the most appropriate classification scheme for training in survey data?

How should small, medium and large be defined? Number of employees? Number of core employees? Assets?

What is the appropriate degree and type of policy intervention?

Chart 1
Relationship between Firm Size and Employer-Sponsored Training: Selected Studies for Canada

Author	Dataset	Findings
Turcotte, Léonard, and Montmarquette (2003)	WES 1999	The proportion of employers supporting classroom and OJT training increases with firm size. The proportion of employees trained, given training is offered, declines with firm size. The proportion of employees who report receiving training rises with firm size.
Leckie, Léonard, Turcotte, and Wallace (2001)	WES 1999	Employee participation in classroom and OTJ training increases with firm size.
Arrowsmith and Oikawa (2001)	AETS 1992, 1994 1998	Firm size is positively associated with education attainment and formal training.
Hum and Simpson (2001)	AETS 1992, 1994, 1998	Incidence and duration of formal training increases with firm size.
Livingstone, Raykov, and Stowe (2001)	AETS 1992, 1994, 1998 and NALL 1999	Incidence of education attainment and formal training increases with firm size.
Betcherman, Leckie, and McMullen (1998)	WTS 1995	Incidence of formal training increases with firm size.
Betcherman, Leckie, and McMullen (1996)	1993 Ekos NSETEI and sample of Dunn and Bradstreet firms 1995	Incidence of any training and formal training is positively associated with firm size.
Jennings (1996)	AETS 1994	Employer sponsored formal training and duration of the training increases with firm size.
Kapsalis (1996)	AETS 1994	The incidence of formal training increases with firm size; and the incidence of employer-sponsored training programs increase with firm size.
Baldwin and Johnson (1995)	Growing Small and Medium Size Enterprises 1992	Firm size is positively associated with formal training of employees and with the likelihood of employers offering training programs.

Figure 1: Training and Education
Within a Large Firm (With a Large Internal Labour Market)

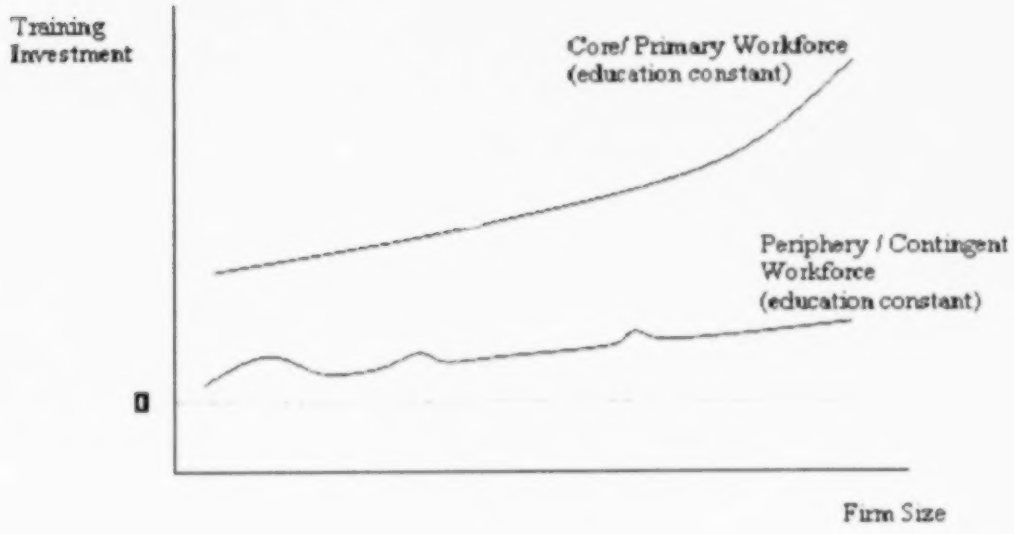

Figure 2: Training and Education
by Firm Size (Importance of Internal Labour Market)

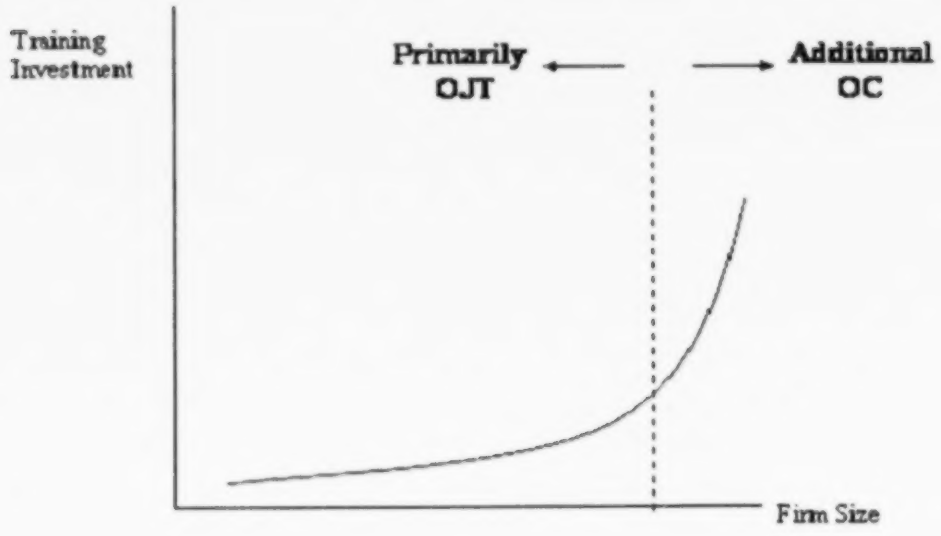

Figure 3: Training and Education
Within a Large Firm (With a Large Internal Labour Market)

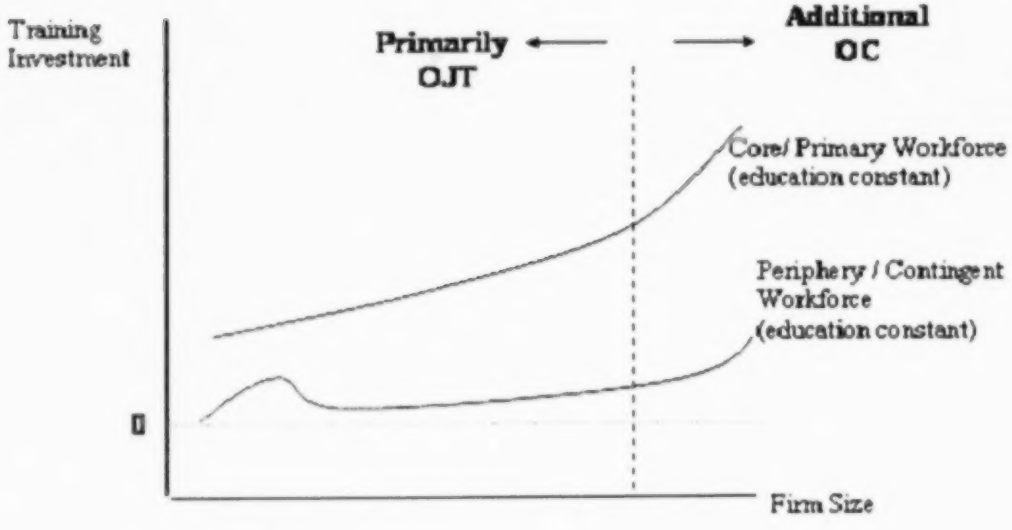

Table 1
Employment Shares for Manufacturing Plants: Canada and the United States

Year	Canada			United States		
	% of Total Employment			% of Total Employment		
	Small	Medium	Large	Small	Medium	Large
1972*	28.6	39.4	32.0	24.8	33.4	41.8
1977	30.4	38.1	31.6	25.4	33.6	41.0
1982	34.2	37.1	28.7	28.4	33.7	37.8
1987	35.1	38.7	26.2	29.5	34.5	36.0
1992	38.1	37.6	24.2	30.6	35.7	33.7
1994	37.3	39.3	23.4	28.7	36.7	34.6
1997	37.3	39.8	22.9	30.6	36.4	33.1

Source: Baldwin et al. (2002) panel A of Table 5.
* For Canada, 1973.
Note: Small, medium and large correspond to less than 100 employees, 100-499 employees and 500+ employees, respectively.

Table 2
Labour Productivity in the Manufacturing Sector by Plant-Size Class Relative to the Industry Average: Canada and the United States

Year	Canada			United States		
	Relative Value-Added Per Employee			Relative Value-Added Per Employee		
	Small	Medium	Large	Small	Medium	Large
1972*	0.82	0.95	1.22	0.84	0.91	1.11
1977	0.78	1.00	1.21	0.81	0.91	1.20
1982	0.81	1.03	1.19	0.78	0.93	1.23
1987	0.73	1.01	1.35	0.75	0.93	1.27
1992	0.72	1.09	1.31	0.72	0.92	1.34
1994	0.68	1.06	1.41	0.71	0.92	1.32
1997	0.67	1.04	1.47	0.69	0.93	1.37

Source: Baldwin et al. (2002) Panel A of Table 6.
* For Canada, 1973.
Note: Small, medium and large correspond to less than 100 employees, 100-499 employees and 500+ employees, respectively.

Table 3
Employer and Employee Training Activity by Establishment Size in Canada, 1999

Establishment Size (Number of Employees)	Proportion of Establishments Supporting Training		Proportion of Employees Trained Among Training Establishments		Proportion of Employees Trained (Employee Reported)	
	Classroom	On-the-Job	Classroom	On-the-Job	Classroom	On-the-Job
< 20	26	40	67	69	26	24
20-49	62	81	51	56	31	30
50-99	77	84	55	54	37	39
100+	85	89	52	46	48	32

Source: Turcotte et al. (2003) Tables 1, 2 and 3.

Table 4a
Proportion of Establishments Supporting Training by Establishment Size, 1999

Establishment Size	Classroom	On-The Job	Classroom or OTJ
1-49	28.92	43.25	52.25
50-499	79.73	86.05	94.28
500+	96.35	91.60	98.05

Source: Author's calculations, 1999 WES

Table 4b
Proportion of Employees Trained (Employee Reported) by Establishment Size, 1999

Establishment Size	Classroom	On-The Job	Classroom or OTJ
1-49	27.54	25.82	46.20
50-499	41.76	34.50	60.75
500+	51.45	32.55	65.71

Source: Author's calculations, 1999 WES

Table 5
Proportion of Establishments Supporting Classroom Training by Subject and Establishment Size, 1999

Subject	Establishment Size		
	1-49	50-499	500+
Orientation for New Employees	7.76	50.85	75.12
Managerial/Supervisory Training	7.52	48.92	70.85
Professional Training	11.73	37.75	67.68
Apprenticeship Training	4.80	22.54	40.36
Sales and Marketing Training	6.79	26.04	23.25
Computer Hardware	6.84	29.79	52.97
Computer Software	12.34	55.35	81.50
Other Office or Non-office Equipment	1.91	21.08	33.31
Group Decision-Making or Problem Solving	4.33	28.76	49.39
Team Building, Leadership, Communications	6.69	39.42	69.60
Occupational Health and Safety, Environmental Protection	8.23	50.27	74.24
Literacy or Numeracy	0.99	4.88	10.69
Other Training	5.11	16.18	15.89

Source: Author's calculations, 1999 WES

Table 6
Proportion of Establishments Supporting On-the-Job Training by Subject and Establishment Size, 1999

Subject	Establishment Size		
	1-49	50-499	500+
Orientation for New Employees	26.45	69.11	76.74
Managerial/Supervisory Training	9.61	41.36	52.58
Professional Training	8.25	27.55	47.01
Apprenticeship Training	7.87	28.20	37.30
Sales and Marketing Training	10.26	25.70	19.33
Computer Hardware	9.00	27.18	42.07
Computer Software	17.84	54.39	72.35
Other Office or Non-office Equipment	5.81	24.92	33.58
Group Decision-Making or Problem Solving	6.49	19.74	39.53
Team Building, Leadership, Communications	9.29	28.46	46.94
Occupational Health and Safety, Environmental Protection	8.90	47.10	55.98
Literacy or Numeracy	1.26	2.31	7.04
Other Training	3.80	9.67	8.29

Source: Author's calculations, 1999 WES

Table 7
Proportion of Establishments Supporting Classroom or On-the-Job Training by Subject and Establishment Size, 1999

Subject	Establishment Size		
	1-49	50-499	500+
Orientation for New Employees	28.19	77.94	87.66
Managerial/Supervisory Training	13.38	59.32	79.60
Professional Training	16.02	44.04	74.76
Apprenticeship Training	9.56	34.89	47.99
Sales and Marketing Training	12.69	34.42	30.98
Computer Hardware	11.72	38.49	60.90
Computer Software	22.24	68.11	87.91
Other Office or Non-office Equipment	6.52	32.71	48.95
Group Decision-Making or Problem Solving	8.37	35.60	57.63
Team Building, Leadership, Communications	12.31	45.38	74.24
Occupational Health and Safety, Environmental Protection	13.16	63.73	81.83
Literacy or Numeracy	1.89	5.60	13.18
Other Training	8.16	19.85	19.13

Source: Author's calculations, 1999 WES

Table 8
Employer and Employee Training Activity by Establishment Change and Size, 1999

Type of Change		Proportion of Establishment Supporting Training		Proportion of Employees Trained (Employee Reported)	
		< 20 Employees	20 or More Employees	< 20 Employees	20 or More Employees
Job Rotation/Multi-Skilling	None	47.2	90.8	43.1	58.9
	Introduced	75.8	97.7	50.5	60.4
Organizational Change	None	38.5	87.0	37.5	53.2
	Introduced	71.0	95.3	52.2	61.4
Technological Change	None	46.5	88.6	42.1	57.9
	Introduced	64.1	97.0	50.0	60.7
Product or Process Innovation	None	40.7	87.4	39.2	56.0
	Introduced	63.6	95.0	49.1	60.9

Source: Leckie et al. (2001) Table 2.1.

Table 9
Rate[1] of Participation in Job-Related Adult Education and Training, Employed Population Aged 25-65 by Gender and Age: 1994-1998

Country	Age				Gender		All
	25-35	36-45	46-55	56-65	Male	Female	
Australia	41.7	41.1	30.6	22.4	37.4	36.6	37.1
Belgium (Flanders)	20.1	17.0	21.3	20.7	20.6	17.4	19.4
Canada	35.9	38.2	34.0	29.9	36.4	34.9	35.7
Chile	21.1	16.8	11.0	5.7	14.5	19.7	16.2
Czech Republic	28.3	23.2	27.0	22.0	29.2	21.7	25.8
Denmark	56.6	58.9	52.0	37.4	51.5	56.5	53.7
Finland	55.8	51.7	43.8	39.7	49.0	50.4	49.7
Hungary	24.7	16.7	17.8	14.6	16.8	22.5	19.6
Ireland	26.0	23.8	20.9	12.8	20.2	28.1	23.1
Italy	25.4	25.2	22.8	20.1	24.4	23.9	24.3
New Zealand	48.1	45.7	43.5	26.0	43.2	44.9	44.0
Norway	54.1	50.5	49.2	31.5	47.3	51.7	49.3
Poland	16.3	17.8	13.8	9.5	16.1	16.0	16.1
Slovenia	36.0	33.7	25.2	32.9	32.3	33.2	32.7
Switzerland	36.1	29.3	29.7	25.2	33.0	29.0	31.3
United Kingdom	55.2	51.5	41.8	27.1	47.6	47.8	47.7
United States	42.9	43.4	43.4	34.7	41.8	42.5	42.1
Average	38.8	38.4	36.5	30.0	36.6	37.9	37.2

Source: Tuijnman and Boudard (2001) Tables 4 and 5.
1 – People with less than 6 hours training are excluded.

Table 10
Rate[1] of Participation and Average Duration in Hours of Job-Related Adult Education and Training, Employed Population Aged 25-62 by Skill/Occupational Group: 1994-1998

Country	Blue-Collar, Low Skill		White-Collar, High Skill	
	Participation Rate	Mean Number of Hours Per Participant	Participation Rate	Mean Number of Hours Per Participant
Australia	21.1	143.0	51.0	155.8
Canada	21.8	261.6	49.2	96.3
Chile	6.0	188.8	38.7	157.7
Czech Republic	17.9	64.3	35.3	163.2
Denmark	29.8	152.2	69.3	119.2
Finland	24.6	100.6	62.2	148.4
Hungary	10.3	121.7	32.8	172.4
Ireland	11.2	84.1	38.0	221.9
Italy	8.5	43.1	45.9	99.0
Netherlands	20.0	198.0	36.4	162.0
New Zealand	30.4	138.7	61.7	152.7
Norway	27.5	140.3	60.2	129.1
Poland	9.0	82.6	30.6	141.2
Slovenia	13.9	104.0	57.6	171.8
Switzerland	17.3	73.0	41.1	114.4
United Kingdom	24.5	74.3	63.3	107.0
United States	14.5	163.9	59.2	92.5
Average	15.5	105.5	54.0	138.1

Source: Tuijnman and Boudard (2001) Table 7.
1 – People with less than 6 hours training are excluded.

Table 11
Rate[1] of Participation and Average Duration in Hours of Job-Related Adult Education and Training, Employed Population Aged 25-62 by Firm Size: 1994-1998

Country	Participation Rate				Mean Number of Hours Per Participant			
	< 20	20-99	100-499	500+	< 20	20-99	100-499	500+
Australia	22.8	35.7	43.9	44.8	141.4	162.5	142.7	175.7
Belgium (Flanders)	14.6	15.3	27.3	21.9	101.0	89.0	127.8	275.1
Canada	30.0	39.8	15.9	29.3	145.4	142.8	75.4	86.0
Chile	5.3	14.4	25.6	36.8	120.2	187.9	126.0	228.9
Czech Republic	19.4	19.5	28.8	31.1	76.9	159.6	171.5	111.0
Denmark	39.8	53.4	57.4	59.8	124.6	100.5	126.8	124.5
Finland	35.1	51.1	46.0	61.5	144.9	178.3	172.6	135.2
Hungary	11.4	23.8	15.4	14.2	189.1	179.7	200.8	149.6
Ireland	10.8	17.4	24.3	29.8	215.2	121.8	362.5	215.9
Italy	12.4	14.9	21.6	32.3	108.9	91.3	60.3	73.6
New Zealand	26.5	53.6	47.6	58.6	142.2	160.3	241.0	210.0
Norway	40.3	47.8	49.6	53.5	98.3	121.7	120.8	107.0
Poland	8.8	21.4	20.8	13.8	76.8	138.8	153.9	85.1
Slovenia	25.7	37.0	28.8	31.5	190.3	112.3	112.3	223.9
Switzerland	26.3	24.7	29.0	35.8	116.0	142.5	149.0	83.4
United Kingdom	26.5	41.2	43.2	56.5	94.1	95.6	84.6	96.0
United States	28.8	34.5	32.1	40.9	77.7	89.5	122.5	72.1
Average	22.7	31.6	30.5	38.8	94.7	107.5	120.1	89.5

Source: Tuijnman and Boudard (2001) Table 10.
1 – People with less than 6 hours training are excluded.

Table 12
Rate of Participation and Average Duration in Hours of Employer-Supported Training, Full-Time Employed Population Aged 25-60: 1994

Country	Incidence of Training Among Employees	Hours of Training per Trainee	Hours of Training per Employee
Canada	33	83	27
Netherlands	38	138	52
Poland	17	118	16
Switzerland	29	85	24
United States	42	69	29

Source: Kapsalis (1997) Figures 3.1 – 3.3.

Table 13
Percentage[1] of Participants in Adult Education and Training by Reported Source of Financial Support, Aged 25-62, 1994-1998

Country	Government Support	Self or Family Support	Employer Support
Australia	8.3	33.4	56.1
Belgium (Flanders)	11.7	37.2	49.9
Canada	17.0	37.3	51.1
Chile	18.7	27.0	42.5
Czech Republic	8.2	25.5	74.3
Denmark	21.8	20.9	61.4
Finland	11.9	21.9	63.1
Hungary	14.1	32.0	64.7
Ireland	12.3	36.9	41.1
Italy	28.2	33.2	36.8
Netherlands	7.3	40.1	52.6
New Zealand	16.0	36.1	56.0
Norway	27.3	19.0	77.5
Poland	5.6	29.3	61.9
Slovenia	20.0	23.5	66.7
Switzerland	13.6	51.5	42.5
United Kingdom	9.2	16.4	71.5
United States	6.7	27.2	66.8
Average	10.1	27.4	63.2

Source: Tuijnman and Boudard (2001) Table 8.
1 – People with less than 6 hours total training are excluded.

Table 14
Characteristics of the Major Canadian Training Data Sources

Description	Adult Education and Training Survey	Workplace and Employee Survey
Type of Survey	Household	Matched Employer-Employee
Periodicity	Bi-Annual	Annual
Time period	1992-1998	1999-2001
Formal Training		
Incidence	Yes	Yes
Duration	Yes	Yes
Cost	Yes*	Limited
Content	Yes	Yes
Informal Training		
Incidence	Yes*	Yes
Duration	Yes*	Yes
Cost	No	No
Content	Yes*	Yes
Outcomes		
Wage	Yes	Yes
Productivity	No	Subjective
Profitability	No	Subjective
Firm Characteristics		
Firm Size	Yes	Yes
Other Characteristics	Limited	Yes
Worker Characteristics	Yes	Yes

Note: * denotes beginning in 2003.

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